



LEVEL-TWO HEALTH AND SAFETY PLAN

Site Name: Smokey Mountain Smelters	Site Contact: James Burrell, Manager	Telephone: 865-573-4473												
Location: 1508 Maryville Pike Knoxville, TN	Client Contact: Beth Walden	Telephone: 404-562-8814												
EPA I.D. No. TN0002318277	Prepared By: Sandra Harrigan	Date: February 28, 2006												
Project No. 05-003-001	Date of Activities: March 1 and 2, 2006													
Objectives: The objective of this project is to conduct an on-site reconnaissance of the Smokey Mountain Smelter Site. Activities will include photographing the site features, and observing drainage routes from the site to nearby surface water bodies.														
Site Type: Check as many as applicable. <table><tr><td><input type="checkbox"/> Active</td><td><input type="checkbox"/> Landfill</td><td><input type="checkbox"/> Residential</td></tr><tr><td><input checked="" type="checkbox"/> Inactive</td><td><input type="checkbox"/> Railroad</td><td><input type="checkbox"/> Industrial</td></tr><tr><td><input checked="" type="checkbox"/> Secured</td><td><input type="checkbox"/> Uncontrolled</td><td><input type="checkbox"/> Urban</td></tr><tr><td><input type="checkbox"/> Unsecured</td><td><input type="checkbox"/> Controlled</td><td><input type="checkbox"/> Other (specify)</td></tr></table>			<input type="checkbox"/> Active	<input type="checkbox"/> Landfill	<input type="checkbox"/> Residential	<input checked="" type="checkbox"/> Inactive	<input type="checkbox"/> Railroad	<input type="checkbox"/> Industrial	<input checked="" type="checkbox"/> Secured	<input type="checkbox"/> Uncontrolled	<input type="checkbox"/> Urban	<input type="checkbox"/> Unsecured	<input type="checkbox"/> Controlled	<input type="checkbox"/> Other (specify)
<input type="checkbox"/> Active	<input type="checkbox"/> Landfill	<input type="checkbox"/> Residential												
<input checked="" type="checkbox"/> Inactive	<input type="checkbox"/> Railroad	<input type="checkbox"/> Industrial												
<input checked="" type="checkbox"/> Secured	<input type="checkbox"/> Uncontrolled	<input type="checkbox"/> Urban												
<input type="checkbox"/> Unsecured	<input type="checkbox"/> Controlled	<input type="checkbox"/> Other (specify)												
Initial Site information The site consists of an inactive aluminum smelter and an inactive fertilizer factory. The property is about 29 acres (on three parcels of land) in area and is partially barren and partially wooded. The site consists of large industrial process buildings, a 25 x 100 feet lagoon, and numerous waste piles located throughout the property. Some of the on-site buildings have partially collapsed. The facility utilized sulfuric acid in the production of fertilizers. Potassium nitrate also was used to make gun powder, fertilizers, and medicine. An aluminum smelter also operated onsite.														
Wind Speed and Direction (Approach from upwind):	Temperature (°F):	Precipitation:												
		Forecast:												
		Precipitation:												

Note: A detailed site sketch is provided on Page 9 of 12.



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Initial Isolation and Protective Action Distances: Use the "2000 Emergency Response Guidebook" (ERG)

Initial Isolation Distance: This zone should extend in all directions, 660 feet for unknown hazards and 0.5 mile for tanker truck or rail car incidents.
NOTE: Keep a maximum distance away for unknown sites until the identity of the material(s) are determined.

Subsequent Isolation and Protection Action Zones Based on Air Monitoring Results:

NOTE: Distance at sites with unknown hazards should be increased, if necessary, based on air monitoring results.

Waste Type: ☒ Liquid ☒ Solid ☐ Sludge ☐ Gas ☒ Unknown

Waste Characteristics: Field screening and/or Hazcat TM test may be used to identify if product-specific information is not available. Check as many as applicable.

<input checked="" type="checkbox"/> Corrosive	<input checked="" type="checkbox"/> Flammable	<input type="checkbox"/> Unknown
<input type="checkbox"/> Toxic	<input type="checkbox"/> Volatile	<input type="checkbox"/> Peroxide forming
<input type="checkbox"/> Inert	<input checked="" type="checkbox"/> Reactive	<input type="checkbox"/> Other (specify)
<input type="checkbox"/> Ignitable	<input type="checkbox"/> Radioactive	<input type="checkbox"/> Other (specify)

Hazard(s) of Concern: Check as many as applicable.

<input type="checkbox"/> Heat stress	<input type="checkbox"/> Overhead utilities
<input checked="" type="checkbox"/> Cold stress	<input type="checkbox"/> Confined space(s)
<input checked="" type="checkbox"/> Explosion or fire hazard	<input type="checkbox"/> Noise
<input type="checkbox"/> Oxygen deficiency	<input checked="" type="checkbox"/> Biological hazard
<input type="checkbox"/> Radiological hazard	<input checked="" type="checkbox"/> Inorganic chemicals
<input type="checkbox"/> Underground storage tanks	<input type="checkbox"/> Organic chemicals
<input checked="" type="checkbox"/> Surface tanks	<input type="checkbox"/> Heavy equipment
<input type="checkbox"/> Buried utilities	<input type="checkbox"/> Other (specify) _____

Explosion or Fire Potential: ☐ High ☐ Medium ☒ Low ☐ Unknown

**Chemical Products Tetra Tech EM Inc. Will Use or Store On Site:** (Attach a Material Safety Data Sheet [MSDS] for each item.)

- | | | | |
|--|--|--|--|
| <input type="checkbox"/> Alconox® or Liquinox® | <input type="checkbox"/> Calibration gas (Methane) | <input type="checkbox"/> Hexane | <input type="checkbox"/> Isopropyl alcohol |
| <input type="checkbox"/> Hydrochloric acid (HCl) | <input type="checkbox"/> Calibration gas (Isobutylene) | <input type="checkbox"/> Household bleach (NaOCl) | <input type="checkbox"/> Hazcat™ Kit |
| <input type="checkbox"/> Nitric acid (HNO ₃) | <input type="checkbox"/> Calibration gas (Pentane) | <input type="checkbox"/> Sulfuric acid (H ₂ SO ₄) | <input type="checkbox"/> Mark I Kits (number?) _____ |
| <input type="checkbox"/> Sodium hydroxide (NaOH) | <input type="checkbox"/> Hydrogen gas | <input type="checkbox"/> Acetic acid | <input type="checkbox"/> Other (specify) <u>None</u> |

Applicable Safe Work Practices (SWP) attach to ERHASP:*Check as many as applicable*

- | | |
|-------------------------------------|---|
| <input checked="" type="checkbox"/> | SWP 6-1 - General Safe Work Practices |
| <input type="checkbox"/> | SWP 6-2 - Control of Hazardous Energy Sources (Lockout/Tagout) |
| <input type="checkbox"/> | SWP 6-3 - Safe Drilling Practices |
| <input type="checkbox"/> | SWP 6-4 - Excavation Practices |
| <input checked="" type="checkbox"/> | SWP 6-5 - Working Over or Near Water |
| <input type="checkbox"/> | SWP 6-6 - Hot Work Practices |
| <input type="checkbox"/> | SWP 6-7 - Special Site Hazards |
| <input type="checkbox"/> | SWP 6-8 - Safe Electrical Work Practices |
| <input type="checkbox"/> | SWP 6-9 - Fall Protection Practices |
| <input type="checkbox"/> | SWP 6-10 - Portable Ladder Safety |
| <input type="checkbox"/> | SWP 6-11 - Drum and Container Handling Practices |
| <input type="checkbox"/> | SWP 6-12 - Shipping Dangerous Goods |
| <input checked="" type="checkbox"/> | SWP 6-13 - Flammable Hazards and Ignition Sources |
| <input type="checkbox"/> | SWP 6-14 - Spill and Discharge Control Practices |
| <input type="checkbox"/> | SWP 6-15 - Heat Stress |
| <input checked="" type="checkbox"/> | SWP 6-16 - Cold Stress |
| <input type="checkbox"/> | SWP 6-17 - Biohazards |
| <input type="checkbox"/> | SWP 6-18 - Underground Storage Tank Removal Practices |
| <input type="checkbox"/> | SWP 6-19 - Working Safely with Hydrazine |
| <input type="checkbox"/> | SWP 6-20 - Working Safely with Benzene |
| <input type="checkbox"/> | SWP 6-21 - Radiation Safety Practices |
| <input type="checkbox"/> | SWP 6-22 - Hydrographic Data Collection |
| <input type="checkbox"/> | SWP 6-23 - Permit-Required Confined Space |
| <input type="checkbox"/> | SWP 6-24 - Non-Permit-Required Confined Space |
| <input type="checkbox"/> | SWP 6-25 - Oil and Petroleum Distillate Fuel Product Hazards |
| <input type="checkbox"/> | SWP 6-26 - Use of Heavy Equipment |
| <input type="checkbox"/> | SWP 6-27 - Respirator Cleaning Procedures |
| <input type="checkbox"/> | SWP 6-28 - Safe Work Practices for Use of Air Purifying Respirators |
| <input type="checkbox"/> | SWP 6-29 - Respirator Qualitative Fit Testing Procedures |
| <input type="checkbox"/> | SWP 6-32 - Safe Work Practice for Sampling Anthrax Contamination in Buildings |

Tetra Tech Employee Training and Medical Requirements:**Basic Training and Medical**

- | | |
|-------------------------------------|--|
| <input checked="" type="checkbox"/> | Initial 40 Hour Training |
| <input type="checkbox"/> | 8-Hour Supervisor Training (one-time) |
| <input checked="" type="checkbox"/> | Current 8-Hour Refresher Training |
| <input checked="" type="checkbox"/> | Current Medical Clearance (including respirator use) |
| <input checked="" type="checkbox"/> | Current First Aid Training (minimum 1 Tetra Tech employee on site) |
| <input checked="" type="checkbox"/> | Current CPR Training (minimum 1 Tetra Tech employee on site) |

Other Specific Training

- | | |
|--------------------------|---|
| <input type="checkbox"/> | Confined Space Training |
| <input type="checkbox"/> | Level A Training |
| <input type="checkbox"/> | Radiation Training |
| <input type="checkbox"/> | Atropine (Nerve Agent Antidote) Injector Training |
| <input type="checkbox"/> | Other _____ |



LEVEL-TWO HEALTH AND SAFETY PLAN

Materials Present or Suspected at Site	Highest Observed Concentration (specify units and media)	Exposure Limit (specify ppm or mg/m ³)	IDLH Level (specify ppm or mg/m ³)	Primary Hazards of the Material (explosive, flammable, corrosive, toxic, volatile, radioactive, biohazard, oxidizer, etc.)	Symptoms and Effects of Acute Exposure	Photo-ionization Potential (eV)
Aluminum	96,000 mg/kg	PEL = 15 mg/m ³ REL = 5 mg/m ³ TLV =	NE	Explosions	Irritate eyes and respiratory system	
Antimony	13 mg/kg	PEL = .5 mg/m ³ REL = .5 mg/m ³ TLV =	50 mg/m ³	Explosion	Irritate eyes, skin, nose, throat	
Arsenic	11 mg/kg	PEL = 0.010 mg/m ³ REL = .002 mg/m ³ TLV =	5 mg/m ³	Toxic	Ulceration of nasal septum	
Cadmium	15.6 mg/kg	PEL = .005 mg/m ³ REL = TLV =	9 mg/m ³	Toxic	Inhalation and respiratory problems	
Chromium	112 mg/kg	PEL = 1 mg/m ³ REL = .5 mg/m ³ TLV =	250 mg/m ³	Toxic	Inhalation, ingestion, skin/eye contact problems	
Copper	42,000 mg/kg	PEL = .1 mg/m ³ REL = TLV =	100 mg/m ³		Inhalation and skin/eye contact problems	
Lead	29,500 mg/kg	PEL = .05 mg/m ³ REL = .05 mg/m ³ TLV =	100 mg/m ³	Toxic	Inhalation, ingestion, contact with eyes/skin problems	
		PEL = REL = TLV =				
Information Source(s): NIOSH Pocket Guide						

Note: Use the following short forms to complete the table above.

A = Air
CARC = Carcinogenic
eV = Electron volt
GW = Groundwater

IDLH = Immediately dangerous to life or health
mg/m³ = Milligram per cubic meter
NA = Not available
NE = None established

PEL = Permissible exposure limit
ppm = Part per million
REL = Recommended exposure limit
S = Soil

SW = Surface water
TLV = Threshold limit value
U = Unknown



LEVEL-TWO HEALTH AND SAFETY PLAN

Field Activities Covered Under This Plan:									
Task Description	Level of Protection ¹								Date of Activities
	Primary				Contingency				
1 site walk through	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input checked="" type="checkbox"/> D	<input type="checkbox"/> A	<input type="checkbox"/> B	<input checked="" type="checkbox"/> C	<input type="checkbox"/> D	
2 observing drainage routes to nearby surface water	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input checked="" type="checkbox"/> D	<input type="checkbox"/> A	<input type="checkbox"/> B	<input checked="" type="checkbox"/> C	<input type="checkbox"/> D	
3	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	
4	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	
5	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	
Site Personnel and Responsibilities (include subcontractors):									
Employee Name and Office Code	Task(s)			Responsibilities					
Sandra Harrigan	Site walk through; observe drainage routes			<ul style="list-style-type: none"> Project Manager or Field Team Leader: Directs project investigation activities, makes site safety coordinator (SSC) aware of pertinent project developments and plans, and maintains communications with client as necessary. Site Safety Coordinator (SSC): Ensures that appropriate personal protective equipment (PPE) is available, enforces proper utilization of PPE by on-site personnel, suspends investigative work if he or she believes that site personnel are or may be exposed to an immediate health hazard, implements the health and safety plan, and reports any observed deviations from anticipated conditions described in the health and safety plan to the health and safety representative. Field Personnel: Completes tasks as directed by the project manager, field team leader, and SSC, and follows all procedures and guidelines established in the Tetra Tech, Inc., Health and Safety Manual. 					

Note: ¹ See next page for details regarding levels of protection



LEVEL-TWO HEALTH AND SAFETY PLAN

Protective Equipment: (Indicate type or material as necessary for each task.)				
Task	Primary Level of Protection (A,B,C,D)	PPE Component Description (Primary)	Contingency Level of Protection (A, B, C, D)	PPE Component Description (Contingency)
1	D	Respirator type: Cartridge type (if applicable): CPC material: Glove material(s): Boot material: Other:	C	Respirator type: Cartridge type (if applicable): CPC material: Glove material(s): Boot material: Other:
2		Respirator type: Cartridge type (if applicable): CPC material: Glove material(s): Boot material: Other:		Respirator type: Cartridge type (if applicable): CPC material: Glove material(s): Boot material: Other:
3		Respirator type: Cartridge type (if applicable): CPC material: Glove material(s): Boot material: Other:		Respirator type: Cartridge type (if applicable): CPC material: Glove material(s): Boot material: Other:
4		Respirator type: Cartridge type (if applicable): CPC material: Glove material(s): Boot material: Other:		Respirator type: Cartridge type (if applicable): CPC material: Glove material(s): Boot material: Other:
5		Respirator type: Cartridge type (if applicable): CPC material: Glove material(s): Boot material: Other:		Respirator type: Cartridge type (if applicable): CPC material: Glove material(s): Boot material: Other:

Notes:

All levels of protection must include eye, head, and foot protection.

CPC = Chemical protective clothing

Thermoluminescent Dosimeter (TLD) Badges must be worn to all field activities. TLDs must be worn under CPC.



LEVEL-TWO HEALTH AND SAFETY PLAN

Monitoring Equipment: (Specify instruments needed for each task; attach additional sheets as necessary)				
Instrument	Task	Instrument Reading	Action Guideline	Comments
Combustible gas indicator model:	<input type="checkbox"/> 1	0 to 10% LEL	Monitor; evacuate if confined space	<input checked="" type="checkbox"/> Not needed
	<input type="checkbox"/> 2	10 to 25% LEL	Potential explosion hazard; notify SSC	
	<input type="checkbox"/> 3			
	<input type="checkbox"/> 4	>25% LEL	Explosion hazard; interrupt task; evacuate site; notify SSC	
	<input type="checkbox"/> 5			
Oxygen meter model:	<input type="checkbox"/> 1	>23.5% Oxygen	Potential fire hazard; evacuate site	<input checked="" type="checkbox"/> Not needed
	<input type="checkbox"/> 2	23.5 to 19.5% Oxygen	Oxygen level normal	
	<input type="checkbox"/> 3	<19.5% Oxygen	Oxygen deficiency; interrupt task; evacuate site; notify SSC	
	<input type="checkbox"/> 4			
	<input type="checkbox"/> 5			
Radiation survey meter model:	<input type="checkbox"/> 1	Normal background	Proceed	<ul style="list-style-type: none"> Annual exposure not to exceed 1,250mrem per quarter Background reading must be taken in an area known to be free of radiation sources. <input checked="" type="checkbox"/> Not needed
	<input type="checkbox"/> 2	Two to three times background	Notify SSC	
	<input type="checkbox"/> 3	>Three times background	Radiological hazard; interrupt task; evacuate site; notify Health Physicist	
	<input type="checkbox"/> 4			
	<input type="checkbox"/> 5			
Photoionization detector model: <input type="checkbox"/> 11.7 eV <input type="checkbox"/> 10.6 eV <input type="checkbox"/> 10.2 eV <input type="checkbox"/> 9.8 eV <input type="checkbox"/> _____ eV	<input type="checkbox"/> 1	Any response above background to 5 ppm above background	Level C ^a is acceptable Level B is recommended	<ul style="list-style-type: none"> These action levels are for unknown gases or vapors. After the contaminants are identified, action levels should be based on the specific contaminants involved. <input checked="" type="checkbox"/> Not needed
	<input type="checkbox"/> 2	> 5 to 500 ppm above background	Level B	
	<input type="checkbox"/> 3	> 500 ppm above background	Level A	
	<input type="checkbox"/> 4			
	<input type="checkbox"/> 5			
Flame ionization detector model:	<input type="checkbox"/> 1	Any response above background to 5 ppm above background	Level C ^a is acceptable Level B is recommended	<ul style="list-style-type: none"> These action level are for unknown gases or vapors. After the contaminants are identified, action levels should be based on the specific contaminants involved. <input checked="" type="checkbox"/> Not needed
	<input type="checkbox"/> 2	>5 to 500 ppm above background	Level B	
	<input type="checkbox"/> 3	>500 above background	Level A	
	<input type="checkbox"/> 4			
	<input type="checkbox"/> 5			
Detector tube models:	<input type="checkbox"/> 1	Specify: < ½ the PEL	Specify:	<ul style="list-style-type: none"> The action level for upgrading the level of protection is one-half of the contaminant's PEL. If the PEL is reached, evacuate the site and notify a safety specialist <input checked="" type="checkbox"/> Not needed
	<input type="checkbox"/> 2	> ½ the PEL		
	<input type="checkbox"/> 3			
	<input type="checkbox"/> 4			
	<input type="checkbox"/> 5			
Other (specify):	<input type="checkbox"/> 1	Specify:	Specify:	<input checked="" type="checkbox"/> Not needed
	<input type="checkbox"/> 2			
	<input type="checkbox"/> 3			
	<input type="checkbox"/> 4			
	<input type="checkbox"/> 5			

Notes:

eV= electron volt

LEL=Lower explosive limit

mrem=Millirem

PEL=Permissible exposure limit

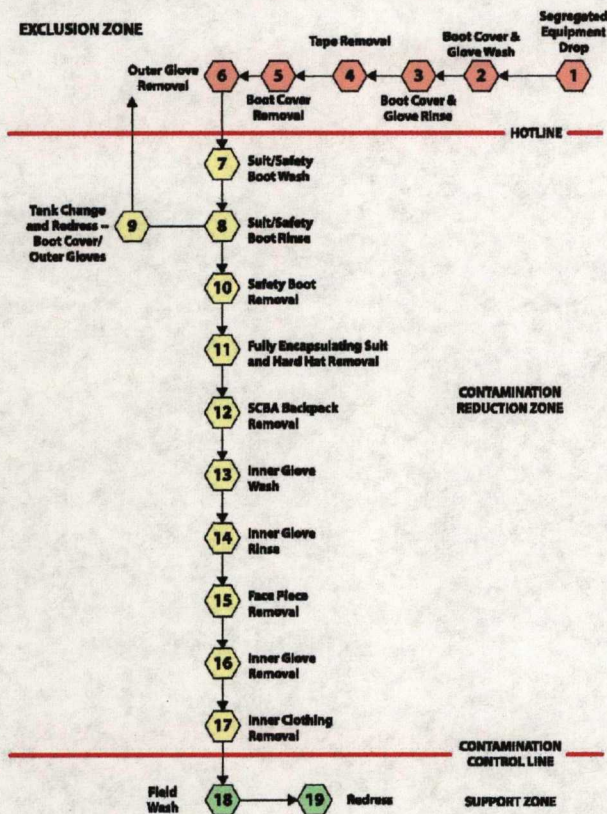
ppm=Part per million

^a Level C may be acceptable for certain tasks in some situations. If you are uncertain whether Level C is appropriate, consult the Regional Safety Officer. Additionally, when working with unknown respiratory hazards, Level C cartridge must provide protection for organic vapors, acid gases, ammonia, amines, formaldehyde, hydrogen fluoride, and particulate aerosols.



Example Decontamination Set-up for Level A PPE: See page 12 of 12 for more information

19 STEP MAXIMUM DECONTAMINATION LAYOUT FOR LEVEL A PROTECTION



Emergency Contacts:

Telephone No.

Work Care	(800) 455-6155
U.S. Coast Guard National Response Center	(800) 424-8802
InfoTrac	(800) 535-5053
Fire department	911 or Fill in
Police department	911 or Fill in
Tetra Tech EM Inc. Personnel:	
Regional Safety Officer: Fill-in	
Health and Safety Representative: Rick Ecord, CIH	(404) 538-8565
Office Health and Safety Coordinator: Fill-in	
Project Manager: Fill-in	
SSC: Fill-in	

Medical and Site Emergencies:

Signal a site and/or medical emergency with three blasts of a loud horn (car horn, fog horn, etc.). Site personnel should evacuate to the area of safe refuge designated on the site map.

Hospital Name: University of Tennessee Medical Center
Hospital Address: 1924 Alcoa Highway

Hospital Telephone:
General - 865-544-9000 Emergency - 911

Ambulance Telephone: 911 or [fill in](#)

Step-by-step Route to Hospital: (see Page 10 of 12 for route map)

Source: EPA Standard Operating Safety Guides Publication 9285.1-03, June 1992

Note: This page must be posted on site.

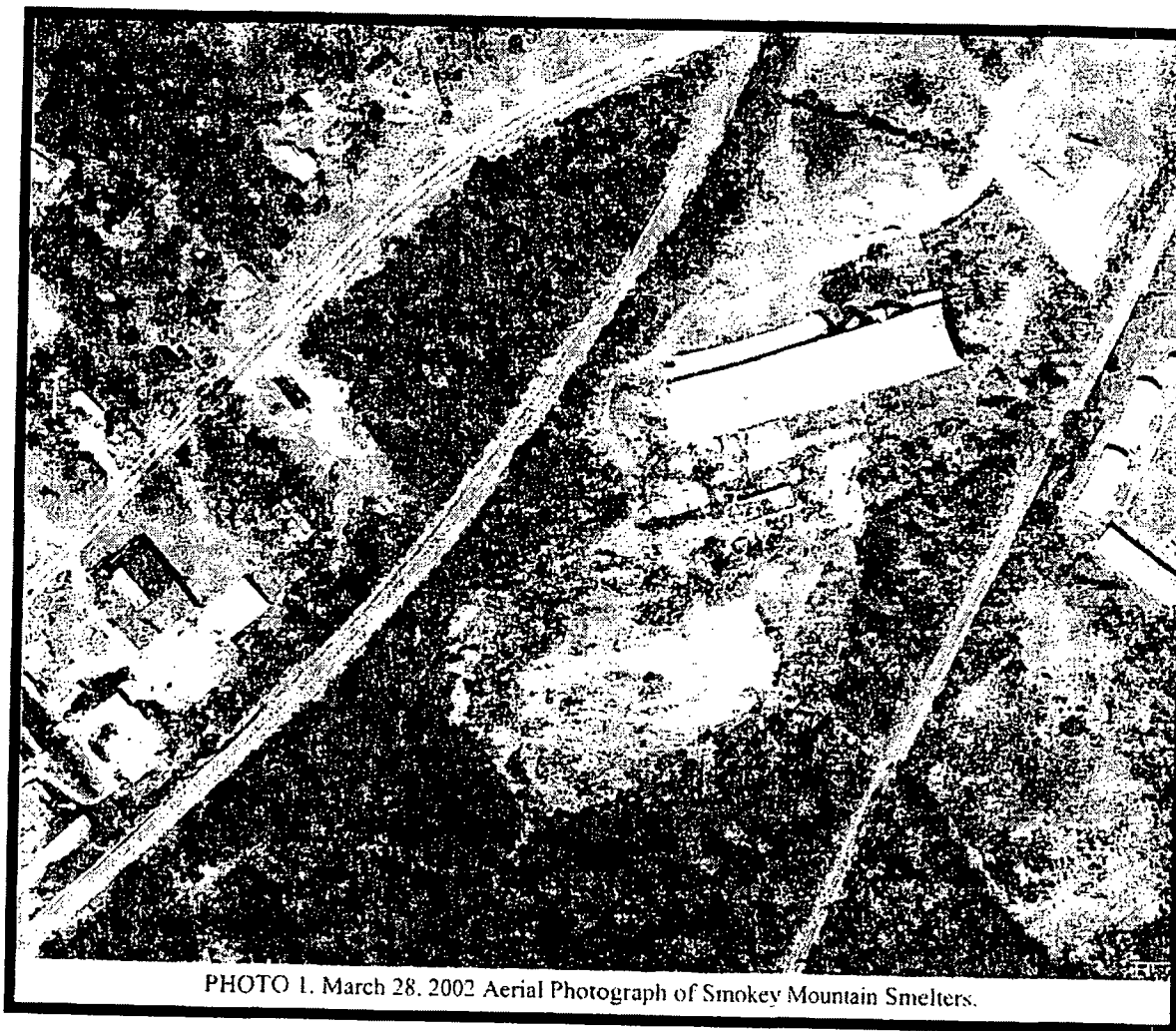


LEVEL-TWO HEALTH AND SAFETY PLAN

Site Map (May be drawn after arrival):

Label the following on your map:

1. Orientation
2. Wind direction
3. Evacuation route
4. Area of safe refuge
5. Exclusion zone
6. Contamination reduction zone (CRZ)
7. Support zone
8. Location(s) of hazardous materials
9. Monitoring Location(s)
10. Sampling location(s)
11. Command post



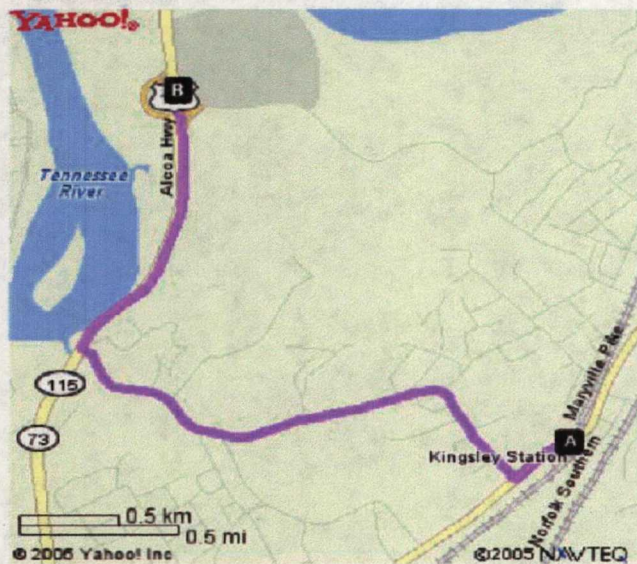
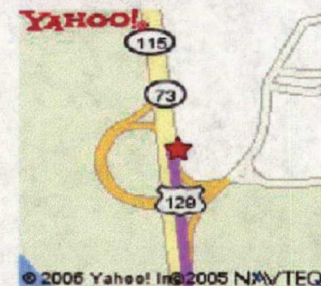
**Hospital Route Map (attach or insert):**

Hospital maps may be obtained from <http://maps.yahoo.com>. Enter your site location and then click "Community Services" and select hospitals. The nearest hospitals to the site will be shown.

Your Directions

1.	Start at 1508 MARYVILLE PIKE, KNOXVILLE - go 0.2 mi
2.	Turn R on WOODSON DR - go 1.7 mi
3.	Turn R on ALCOA HWY - go 1.0 mi
4.	Arrive at 1924 ALCOA HWY, KNOXVILLE

When using any driving directions or map, it's a good idea to do a reality check and make sure the road still exists, watch out for construction, and follow all traffic safety precautions. This is only to be used as an aid in planning.

Your Full Route**Your Destination**

Address:
1924 Alcoa Hwy
Knoxville, TN 37920-1511

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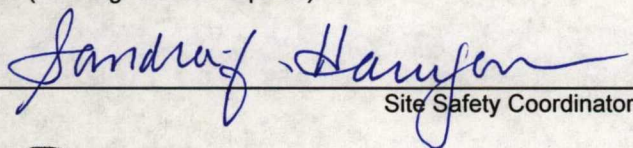
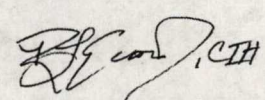
APPROVAL AND SIGN-OFF FORM

Project No.: 05-003-0001

I have read, understood, and agree with the information set forth in this Health and Safety Plan and will follow the direction of the Site Safety Coordinator as well as procedures and guidelines established in the Tetra Tech, Inc., Health and Safety Manual. I understand the training and medical requirements for conducting field work and have met these requirements

_____ Name	_____ Signature	_____ Date
_____ Name	_____ Signature	_____ Date
_____ Name	_____ Signature	_____ Date
_____ Name	_____ Signature	_____ Date

APPROVALS (Two Signatures Required):

 _____ Site Safety Coordinator	 _____ Health and Safety Plan Reviewer/Approver
3/1/06 _____ Date	3/1/06 _____ Date

Note:

Guidance in the "START Health and Safety Plan Approval Procedures," dated September 19, 2001, must be followed by personnel who prepare and approve any LEVEL-TWO HASP.



LEVEL-TWO HEALTH AND SAFETY PLAN

DEFINITIONS AND NOTES

Emergency Contacts

Work Care - For issues requiring an Occupational Health Physician; assistance is available 24 hours per day, 7 days per week.

InfoTrac - For issues related to incidents involving the transportation of hazardous chemicals; this hotline provides accident assistance 24 hours per day, 7 days per week

U.S. Coast Guard National Response Center - For issues related to spill containment, cleanup, and damage assessment; this hotline will direct spill information to the appropriate state or region

Limitations:

The Level-Two HASP is not appropriate for:

- Projects involving UXO, radiation sources as the primary hazard, or known chemical/biological weapons site must employ the LEVEL-THREE HASP
- Projects of duration longer than one month must employ the LEVEL-THREE HASP
- Projects with more than 5 tasks must employ the LEVEL-THREE HASP

Decontamination:

Decontamination Solutions for Chemical and Biological Warfare Agents^a: PPE and equipment can be decontaminated using 0.5% bleach (1 gallon laundry bleach to 9 gallons water) for biological agents (15 minutes of contact time for anthrax spores; 3 minutes for others) followed by water rinse for chemical and biological agents. In the absence of bleach, dry powders such as soap detergents, earth, and flour can be used. The powders should be applied and then wiped off using wet tissue paper. Finally, water and water/soap solutions can be used to physically remove or dilute chemical and biological agents. Do not use bleach solution on bare skin; use soap and water. Protect decon workers from exposure to bleach.

Decontamination for Radiological and Other Chemicals: Primary decontamination should use Alconox and water unless otherwise specified in chemical specific information resources. The effectiveness of radiation decontamination should be checked using a radiation survey instrument. Decontamination procedures should be repeated until the radiation meter reads less than 100 counts per minute over a 100 square centimeter area when the probe is held 1 centimeter from the surface and moving slower than 2.5 centimeters per second.

Decontamination Corridor: The decontamination set-up can be adjusted to meet the needs of the situation. The Level A decontamination set-up is included on Page 10 because it is the most complicated and critical. When compound- and site-specific information is available, the decontamination procedures can be altered to meet the needs of the specific situation.

Decontamination Waste: All disposable equipment, clothing, and decontamination solutions will be double-bagged or containerized in an acceptable manner and disposed of with investigation-derived waste.

Decontamination Personnel: Decontamination personnel should dress in the same level of PPE or one level below the entry team PPE level.

All investigation-derived waste should be left on-site with the permission of the property owner and the EPA on-scene coordinator. In some instances, decontamination waste and investigation-derived waste will be disposed of by another contractor. DO NOT place waste in regular trash. DO NOT dispose of waste until proper procedures are established.

Notes:

^a Source: Jane's Information Group. 2002. "Jane's Chem-Bio Handbook". Page 39.



TETRA TECH, INC.
HEALTH AND SAFETY MANUAL
VOLUME III

SAFE WORK PRACTICES (SWP)

GENERAL SAFE WORK PRACTICES

SWP NO.: 6-1
ISSUE DATE: JULY 1998
REVISION NO.: 1

Disclaimer: This safe work practice (SWP) is the property of Tetra Tech, Inc. (Tetra Tech), and its subsidiaries. Any reuse of the SWP without Tetra Tech's permission is at the sole risk of the user. The user will hold harmless Tetra Tech for any damages that result from unauthorized reuse of this SWP. Authorized users are responsible for obtaining proper training and qualification from their employer before performing operations described in this SWP.

swp6-01_general_safe_work_practices.doc

GENERAL SAFE WORK PRACTICES

To prevent injuries and adverse health effects, the following general safe work practices (SWP) are to be followed when conducting work involving known and unknown site hazards. These SWPs establish a pattern of general precautions and measures for reducing risks associated with hazardous site operations. This list is not inclusive and may be amended as necessary.

- Do not eat, drink, chew gum or tobacco, take medication, or smoke in contaminated or potentially contaminated areas or where the possibility for the transfer of contamination exists.
- Wash hands and face thoroughly upon leaving a contaminated or suspected contaminated area. A thorough shower and washing must be conducted as soon as possible if excessive skin contamination occurs.
- Avoid contact with potentially contaminated substances. Do not walk through puddles, pools, mud, or other such areas. Avoid, whenever possible, kneeling on the ground or leaning or sitting on drums, equipment, or the ground. Do not place monitoring equipment on potentially contaminated surfaces.
- Remove beards or facial hair that interfere with a satisfactory qualitative respirator fit test or routine pre-entry positive and negative pressure checks.
- Be familiar with and knowledgeable of and adhere to all instructions in the site-specific health and safety plan (HASP). At a minimum, a safety meeting will be held at the start of each project to discuss the HASP. Additional meetings will be held, as necessary, to address new or continuing safety and health concerns.
- Be aware of the location of the nearest telephone and all emergency telephone numbers.
- Attend a briefing on the anticipated hazards, equipment requirements, SWPs, emergency procedures, and communication methods before going on site.
- Plan and delineate entrance, exit, and emergency escape routes.
- Rehearse unfamiliar operations prior to implementation.
- Use the "buddy system" whenever respiratory protection equipment is in use. Buddies should establish hand signals or other means of emergency communication in case radios break down or are unavailable.
- Buddies should maintain visual contact with each other and with other on-site team members by remaining in close proximity in order to assist each other in case of emergency.

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- Minimize the number of personnel and equipment in contaminated areas (such as the exclusion zone). Nonessential vehicles and equipment should remain within the support zone.
- Establish appropriate support, contamination reduction, and exclusion zones.
- Establish appropriate decontamination procedures for leaving the site.
- Immediately report all injuries, illnesses, and unsafe conditions, practices, and equipment to the site safety coordinator (SSC).
- Maintain a portion of the site field logbook as a project safety log. The project safety log will be used to record the names, entry and exit dates, and times on site of all Tetra Tech, subcontractor, and project site visitor personnel; air quality and personal exposure monitoring data; and other information related to safety matters. Form SSC-1, Daily Site Log, may be used to record names of on-site personnel.
- A portable eyewash station should be located in the support zone if chemical splashes to eyes are possible.
- Do not bring matches and lighters in the exclusion zone or contamination reduction zone.
- Observe coworkers for signs of toxic exposure and heat or cold stress.
- Inform coworkers of nonvisual effects of illness if you experience them, such as headaches, dizziness, nausea, or blurred vision.

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TETRA TECH, INC.
HEALTH AND SAFETY MANUAL
VOLUME III

SAFE WORK PRACTICES (SWP)

WORKING OVER OR NEAR WATER

SWP NO.: 6-5
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swp6-05_working_over_or_near_water

WORKING OVER OR NEAR WATER

This safe work practice (SWP) provides guidelines for working over or near bodies of water 3 or more feet deep or swiftly moving water. Workers will observe the requirements of the Occupational Safety and Health Administration (OSHA) specified in Title 29 of the *Code of Federal Regulations* (CFR), Part 1926.106, "Working Over or Near Water." The following sections discuss general procedures, underwater work, and cold water procedures.

1.0 GENERAL PROCEDURES

When working over or near water, the following precautions will be taken:

- All staff and team members must wear a personal flotation device (PFD) within 15 feet of a water body. Personnel will be provided with U.S. Coast Guard (USCG)-approved life jackets or work vests. The PFD should be Class III, which will support the head of an unconscious person above water.
- Life jackets and work vests will be inspected before each use.
- A USCG-approved life-saving skiff will be available.
- Under no circumstances will team members enter water bodies without protective clothing such as rubber boots or waders.
- At least one person will remain on shore as a look-out.

If a team member falls into the water, under no circumstances should another team member enter the water to rescue the person in the water. If possible, a branch, paddle, pole, or similar object should be extended to the person in the water. When the person in the water grabs the extended item, they should be pulled toward the shore or boat. If the person is unconscious, the PFD, clothing, or hair should be hooked to pull the person toward the shore or boat. Once the person has been safely retrieved, necessary emergency medical procedures should be performed by qualified personnel. If none are necessary, the retrieved team member should change into dry clothing as soon as possible after any necessary personal decontamination.

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2.0 UNDERWATER WORK

Underwater work should be performed in accordance with the procedures and guidelines of the Diving Safety Program (Document Control No. 2-15 in Volume I).

3.0 COLD WATER PROCEDURES

When the water temperature is below 45 °F, hypothermia is a serious risk. A person can lose feeling in the extremities within 5 minutes. All field staff members should be familiar with cold water survival techniques or should receive training from an American Red Cross-certified swimming instructor in cold water survival techniques when site conditions warrant such knowledge.

After a person has been rescued from cold water, he or she should change into dry clothes as soon as possible. If the person who has fallen into the water displays hypothermia symptoms, he or she should be treated immediately and taken to a medical facility. Under no circumstances should the hypothermia victim be given hot liquids because this could accelerate shock. Drinks no warmer than normal body temperature are acceptable. If symptoms are severe and evacuation to a medical facility cannot be quickly conducted, any wet clothing should be removed, the victim should be placed in blankets or sleeping bags in a sheltered location, and the rescuer should climb into the blankets or sleeping bag with victim to provide additional warmth. The victim should also be treated continuously for shock, elevating feet and monitoring the victim's pulse and breathing rate.

If a team member falls into cold water, he or she should not remove any clothing while in the water because clothing provides additional insulation. Although clothing creates an added drag while swimming, the insulation outweighs the disadvantage of the additional drag. Each team member should carry a wool hat to place on his or her head in case he or she falls into the water. A wool hat, even when wet, provides good insulation for the head, where a large amount of body heat is lost.

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TETRA TECH, INC.
HEALTH AND SAFETY MANUAL
VOLUME III

SAFE WORK PRACTICES (SWP)

FLAMMABLE HAZARDS AND IGNITION SOURCES

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FLAMMABLE HAZARDS AND IGNITION SOURCES

This safe work practice (SWP) provides guidelines for handling flammable materials and controlling ignition sources in a manner that will prevent explosions and fires that may result in injuries. The guidelines also present procedures for proper flammable liquids transfer.

1.0 RESPONSIBILITIES

The project manager is responsible for ensuring that the work area is evaluated for the presence of flammable hazards and ignition sources and that all precautions provided in this SWP are implemented. The project manager is also responsible for ensuring that appropriate air monitoring procedures are defined in the site-specific health and safety plan (HASP). The site safety coordinator is responsible for recognizing potential flammable hazards and ignition sources, conducting air monitoring, posting warning signs, and notifying on-site workers of the hazards.

All field personnel must know that explosion and fires at a work site may result from any of the following:

- Chemical reaction
- Ignition of explosive or flammable materials
- Agitation of shock-sensitive compounds
- Sudden release of materials under pressure

Field personnel must also understand that each flammable gas and vapor has a minimum concentration in air below which propagation of flame does not occur on contact with an ignition source. This concentration is known as the lower explosive limit (LEL) and is expressed as a percent in air. Likewise, for every flammable gas and vapor, there is also a maximum concentration of gas or vapor in air above which propagation of flame does not occur. This value is known as the upper explosive limit (UEL) and is also expressed as a percent in air. The flammable range of a particular gas or vapor is the range between the LEL and UEL where the gas-air mixture will support combustion.

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Proper precautions must be taken to protect against fire and ignition hazards, including air monitoring, elimination of ignition sources, and proper chemical handling and transfer. These precautions are discussed below.

2.0 AIR MONITORING

Monitoring for flammable or explosive atmospheres is performed using a combustible gas indicator (CGI). This instrument is designed to provide data in terms of the percent LEL. Instructions on the model use, calibration, and operating procedures shall be incorporated into the site-specific HASP as appropriate.

Because flammable gases and vapors can be heavier or lighter than air, it is important to remember that the sampling probe should be moved slowly up and down at multiple levels when monitoring for gases. Response time varies between different meters, sensor types, sample hose lengths, and accessories used.

3.0 ELIMINATION OF IGNITION SOURCES

The risk of fires and explosions will be reduced when ignition sources are eliminated by using the following procedures:

- Ignition sources that are not required for the completion of the project should not be allowed in the exclusion zone or contamination reduction zone at hazardous waste sites or in the vicinity of work associated with flammable materials at any site.
- Warning signs should be posted and the work zone barricaded or blocked off before any work is conducted that might release flammable gases or vapors.
- All ignition sources should be eliminated from areas where flammable gases or vapors may be present or migrate to.
- If the wind direction may carry flammable gases or vapors into areas outside the work zone where ignition sources may be present, work should not be performed without careful monitoring of concentrations at the work zone boundary.
- Sparks caused by friction or electrostatic effects should be controlled using with proper grounding and bonding procedures for transfer of flammable liquids. This requires maintaining constant contact using metal between the containers and providing a metallic route to the ground to discharge electrostatic buildup.

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- Sparkless tools should be used.

4.0 PROPER CHEMICAL HANDLING AND TRANSFER

Precautions to reduce the risk of fire and explosion during chemical handling and transfer include the following:

- Liquids and residues should be removed from containers or tanks using explosion-proof or air-driven pumps.
- Pump motors and suction hoses should be bonded to the container or tank or otherwise grounded to prevent electrostatic ignition hazards.
- If a vacuum truck is used to remove liquids or residues, the area of operation for the vacuum truck should be vapor or gas free. The truck should be located upwind and outside of the path of probable gas or vapor travel. Vacuum pump exhaust gases should be discharged downwind of the truck through a hose of adequate size and length.
- After chemicals have been transferred, lines leading to the truck should be disconnected using nonsparking procedures and then the lines should be drained of their contents. Precautions should be taken to ensure that the contents of the lines do not spill into the environment during line disconnection.
- Only nonsparking or nonheat-producing tools should be used for opening containers and tanks. Electrical equipment shall also be explosion-proof.

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TETRA TECH, INC.
HEALTH AND SAFETY MANUAL
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SAFE WORK PRACTICES (SWP)

COLD STRESS

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swp6-16_cold_stress

COLD STRESS

This safe work practices (SWP) describes situations where cold stress is likely to occur and discusses procedures for the prevention and treatment of cold-related injuries and illnesses. Cold conditions may present health risks to employees during field activities. The two primary factors that influence the risk potential for cold stress are temperature and wind velocity. Wetness can also contribute to cold stress. Other factors that increase susceptibility to cold stress include age (very young or old), smoking, alcohol consumption, fatigue, and wet clothing. Hypothermia can occur at temperatures above freezing if the individual has on wet or damp clothing or is immersed in cold water. The combined effect of temperature and wind can be evaluated using a wind chill index as shown in Table 1.

Bare flesh and body extremities that have high surface area-to-volume ratios such as fingers, toes, and ears are most susceptible to wind chill or extremely low ambient temperatures. Because cold stress can create the potential for serious injury or death, employees must be familiar with the signs and symptoms and various treatments for each form of cold stress. Table 2 provides information on frostbite and hypothermia, the two most common forms of cold-related injuries.

Training is an essential component of cold stress prevention. Employees are instructed to recognize and treat cold-related injuries during 8-hour health and safety refresher and first aid training courses. When working in cold environments, specific steps should be taken to lessen the chances of cold-related injuries. These include the following:

- Protecting of exposed skin surfaces with appropriate clothing (such as face masks, handwear, and footwear) that insulates, stays dry, and blocks wind
- Shielding the work area with windbreaks to reduce the cooling effects of wind
- Providing equipment for keeping workers' hands warm by including warm air jets and radiant heaters in addition to insulated gloves
- Using adequate insulating clothing to maintain a body core temperature of above 36 °C
- Providing extra insulating clothing on site

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TABLE 1
COOLING POWER OF WIND ON EXPOSED FLESH EXPRESSED
AS EQUIVALENT TEMPERATURE

Estimated Wind Speed (in miles per hour - mph)	Actual Temperature Reading (°F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent Chill Temperature (°F)											
CALM	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
(Wind speeds greater than 40 mph have little additional effect.)	<i>LITTLE DANGER</i> in less than 1 hour with dry skin; maximum danger from false sense of security				<i>INCREASING DANGER</i> from freezing of exposed flesh within 1 minute				<i>GREAT DANGER</i> that flesh may freeze within 30 seconds			

Trench foot may occur at any point on this chart.

Source: Modified from American Conference of Governmental Industrial Hygienists. 1997.
"Threshold Limit Values for Chemical Substances and Physical Agents."

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TABLE 2
COLD STRESS CONDITIONS

Condition	Causes	Signs and Symptoms	Treatment
Frostbite	Freezing of body tissue, usually the nose, ears, chin, cheeks, fingers, or toes	<ul style="list-style-type: none">• Pain in affected area that later goes away• Area feels cold and numb• Incipient frostbite (frostnip) - skin is blanched or whitened and feels hard on the surface• Moderate frostbite - large blisters• Deep frostbite - tissues are cold, pale, and hard	<ul style="list-style-type: none">• Move affected worker to a warm area• Immerse affected body part in warm (100 to 105 °F) water—not hot!• Handle affected area gently; do not rub• After warming, bandage loosely and seek immediate medical treatment
Hypothermia	Exposure to freezing or rapidly dropping temperatures	<ul style="list-style-type: none">• Shivering, dizziness, numbness, weakness, impaired judgment, and impaired vision• Apathy, listlessness, or sleepiness• Loss of consciousness• Decreased pulse and breathing rates• Death	<ul style="list-style-type: none">• Immediately move affected person to warm area• Remove all wet clothing and redress with loose, dry clothes• Provide warm, sweet drinks or soup (only if conscious)• Seek immediate medical treatment

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- Reducing the duration of exposure to cold
- Changing wet or damp clothing as soon as possible

During periods of extreme cold (10 °F or less) workers should use the buddy system to ensure constant protective observation.

Specific monitoring criteria are not established for cold stress. However, employees should be thoroughly cognizant of the signs and symptoms of frostbite and hypothermia (see Table 1) in themselves as well as in coworkers. All instances of cold stress should be reported to the site safety coordinator. Work schedules may be adjusted and warm-up regimes imposed as needed to deal with temperature and wind conditions.

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